

**Unit: Kinetics**

**IB Expectations/ Assessment Criteria**

**DP Group 4: Chemistry, DP - Age 16-18, Objectives**

It is the intention of all the Diploma Programme experimental science courses that students achieve the following objectives.

- 1. Demonstrate an understanding of: a. scientific facts and concepts b. scientific methods and techniques c. scientific terminology d. methods of presenting scientific information.
- 2. Apply and use: a. scientific facts and concepts b. scientific methods and techniques c. scientific terminology to communicate effectively d. appropriate methods to present scientific information.
- 3. Construct, analyse and evaluate: a. hypotheses, research questions and predictions b. scientific methods and techniques c. scientific explanations.
- 4. Demonstrate the personal skills of cooperation, perseverance and responsibility appropriate for effective scientific investigation and problem solving.
- 5. Demonstrate the manipulative skills necessary to carry out scientific investigations with precision and safety.

**Approach**

Based on previous knowledge.  
(Only the AHL portion will be done this semester. Core was done last semester.)

**Significant concept(s) / Considerations**

Students recall factors that increases the rate of reaction. The concept is developed.

**Guiding Questions**

If the rate of reaction is calculated then prediction of the existence of a monument becomes very realistic (considering that only the conditions remain the same over a long period of time.

**Learner Profile**

- Inquirers
- Knowledgeable
- Communicators
- Open-minded
- Reflective

**Central Idea / Content**

6.1 Rates of reaction  
6.2 Collision theory  
16.1 Rate Expression

**Learning Objectives**

Define the term *rate of reaction*.  
Describe suitable experimental procedures for measuring rates of reactions.

<p>16.2 Reaction mechanism</p> <p>16.3 Activation energy</p>	<p>Analyse data from rate experiments.</p> <p>Describe the kinetic theory in terms of the movement of particles whose average energy is proportional to temperature in kelvins.</p> <p>Define the term <i>activation energy</i>, <math>E_a</math>.</p> <p>Describe the collision theory.</p> <p>Predict and explain, using the collision theory, the qualitative effects of particle size, temperature, concentration and pressure on the rate of a reaction.</p> <p>Sketch and explain qualitatively the Maxwell–Boltzmann energy distribution curve for a fixed amount of gas at different temperatures and its consequences for changes in reaction rate.</p> <p>Describe the effect of a catalyst on a chemical reaction.</p> <p>Sketch and explain Maxwell – Boltzmann curves for reactions with and without catalysts.</p> <p>AHL</p> <p>Distinguish between the terms <i>rate constant</i>, <i>overall order of reaction</i> and <i>order of reaction</i> with respect to a particular reactant.</p> <p>Deduce the rate expression for a reaction from experimental data.</p> <p>Solve problems involving the rate expression.</p> <p>Sketch, identify and analyse graphical representations for zero-, first- and second-order reactions.</p> <p>Explain that reactions can occur by more than one step and that the slowest step determines the rate of reaction (rate-determining step).</p> <p>Describe the relationship between reaction mechanism, order of reaction and rate-determining step.</p> <p>Describe qualitatively the relationship between the rate constant (<math>k</math>) and temperature (<math>T</math>).</p> <p>Determine activation energy (<math>E_a</math>) values from the Arrhenius equation by a graphical method.</p>
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<u>Assessment</u>		
<b>Worksheets/Assignments</b> <b>Summative: Other Written Assessment</b> Worksheets to assess students' learning on daily basis.		
<b>Quizzes and Test</b> <b>Summative: Standardized Test</b> Quizzes on a regular basis and a unit Test will be given.		
<b>Lab</b> <b>Summative: Lab Assignment</b> Work based mainly on DCP and ICT.		
<b>Information Literacy &amp; ICT</b>	<b>International Mindedness</b>	<b>TOK</b>
ICT Lab on rate of reaction.	How to protect monuments of international fame?	The empirical nature of the topic should be emphasized. Experimental results can support the theory but cannot prove it.
<b>Strategies / Activities / Differentiation</b>		<b>Resources</b>
Students with learning difficulties will have support lessons.		Chemistry Course Companion Teacher assisted learning materials Independent research work Worksheets
<b>Unit Reflections</b>		
Students have done the core portion last semester and only the AHL portion will be done.		